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ABSTRACT

This paper reports on a study of the 1980 Maryland State Department of Education school improvement project utilizing Mastery Learning. It examines the instructional process implementation, the impact of one pilot school, and the statewide program through observation, surveys, interviews, document analysis, and participant self-reports. Data were analyzed by site, role, and activity area. The findings are reported for two levels: statewide and within the pilot school. The results indicate that Mastery Learning is effective and appropriate as an instructional improvement process at all grade levels (K-12) and in a wide variety of subjects. Implementation requires considerable time and effort, and teachers expressed dislike for the amount of planning time and recordkeeping required by the program. This study demonstrates that a state department of education can improve instruction with limited financial input and legislation. Significant features of the program include: a cross-hierarchical team training approach; state department of education leadership and assistance; voluntary participation; and a team effort. The author states that Mastery Learning works, but longitudinal studies are needed to determine the cumulative and sustained effect for students. (MD)

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Mastery Learning: A Statewide Initiative Implemented through Local Effort

David P. Miller

Maryland State Department of Education
Division of Compensatory, Urban, and Supplementary Programs

March 1983

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INTRODUCTION

The rising public outcry for improvements in our public schools has forced educators to examine the instruction being provided and to seek ways of improving it. The responsibility for educational leadership borne by the state education agency (SEA) demands that statewide programs be developed in response to this critical need. The responsibility for the delivery of effective instruction by local educators requires commitment and energy.

How can state and local educators implement a model of school improvement that impact on students? In Maryland, the answer to this question is SITIP (School Improvement Through Instructional Process), a program initiated by the Maryland State Department of Education in 1980 which incorporates Mastery Learning as one of four research based instructional processes.*

This paper presents a study which examines Mastery Learning as a model for instructional improvement, analyzes the implementation process and determines interactive influences. The study focuses on two distinct but related levels of implementation. Implementation is first examined statewide and then within the pilot school of one of the participating districts. At each level, the following program components are reviewed and analyzed:

- Scope and Intensity of Implementation
- Participation in Planning and Training
- Time Spent on Topic
- Roles and Responsibilities
- Participant Needs and Concerns
- Impact

*The program design incorporated an action research approach in which Research for Better Schools (RBS) served as "third party evaluators." Parts of this paper draw upon the RBS study.

I. BACKGROUND INFORMATION: STATE PERSPECTIVE

A survey of the recent literature on school improvement efforts reveals a variety of programs and projects initiated by state or local education agencies. In general, two basic approaches are used. One approach is to affect school improvement by operationalizing the findings from studies of effective schools and effective classrooms. The knowledge base for this approach is derived from studies such as those conducted by Bloom, Brophy, Brookover, Edmonds, Evertson, Medley, and Stallings.

The other approach is to develop and implement planning strategies based on research findings in the areas of knowledge utilization and planned educational change from studies by Crandall, Fullan, Gross, House, Louis, Miles, Sieber, and others. These studies have identified factors which support instruction innovation, those which are inhibitors, the sources and forms of support, etc.

The school improvement effort in Maryland distinguishes itself from others by incorporating both approaches into a single model. SITIP is designed to affect school improvement through the implementation of research-based strategies. Another distinguishing feature is that SITIP is a cooperative effort involving both state and local education agencies. Leadership and support from the state is coupled with local initiative and decision-making. The SITIP model is based on the significant findings of various studies (e.g., the Rand Study and RDU study) and the models developed by others' analysis of research (e.g., Joyce's staff development model and CBAM). The SITIP model follows most closely that of the Research and Development Utilization Projects (Louis, et al., 1981). (See Table 1).

Table 1

Theoretical Basis of SITIP: Studies and Related Characteristics

Study/Model Research/Developer	Characteristics
Local Process of Change (LPC) Rand Corporation Berman, et al.	perception of school and district staff as cooperative and adaptive allowing for local modifications selection of model based on local need
Research and Development Utilization (RDU) Abt Associates Louis, et at.	research-based models training from product developers intensive training prior to and during implementation external technical assistors selection of model (product) based on local need small amounts of start-up money
Concerns Based Adoption Model (CBAM) University of Texas R & D Center for Teacher Education	identification of stages of concern of participants during adoption process providing technical assistance appropriate to concern
Coaching of Teaching Bruce Joyce	training procedures coaching to ensure transfer intensity of training

Overview of SITIP

SITIP, School Improvement Through Instructional Process, is the voluntary school improvement program undertaken by the Maryland State Department of Education intended to provide training and technical assistance support to LEAs in their adoption and implementation of innovative instructional processes.

The instructional processes selected as models for SITIP had a sound research base and/or had been validated as effective, and were generic to a variety of subjects, curricula and grade levels. The following processes were selected:

- Active Teaching
- Mastery Learning
- Student Team Learning
- Teaching Variables

The SITIP program was organized in six discrete states which may be described as follows: 1) MSDE introduction and orientation of the SITIP program to all LEAs; 2) conduct of awareness sessions and development of local adoption and implementation proposals; 3) conduct of planning sessions; 4) conduct of summer institutes; 5) conduct of follow-up sessions and local implementation; and 6) dissemination within each LEA.

The second year of implementation during the 1982-83 school term represents an additional stage. Included in this stage is additional follow-up training and continued technical assistance to program sites. During this period, some districts have expanded their program within the participating school and others have expanded into additional schools.

A comparison of the design of SITIP to other training programs and projects initiated by MSDE reveals several significant differences. First, it is a cross-hierarchical approach involving central office and school-based staff in decision-making and implementation. In other programs which employed a top-down approach with the state involving only LEA central office staff, the information often failed to reach school-based staff. Next, SITIP not only exposes the participants to new ideas and strategies but requires active involvement in implementation. And, the support from the state level does not stop when the program is implemented but continues over time.

SITIP was designed as a voluntary program, rather than mandated. Nineteen of the twenty-four LEAs opted to participate at the time of the initial request for proposals. Grants of five or ten thousand dollars for one and two-year projects provided some small incentive to participate but could hardly be regarded as the primary motivation. This design reflected the belief that the LEAs' decision must be based on their need to change in order to improve instruction. For most projects, the grant money was a supplement to much greater in-kind contributions made by the LEA.

The LEAs had a great deal of latitude in designing their projects. This was to ensure a design which met the needs of each district. Participating districts decided on one of the models and determined its level and scope of implementation. State input into the development of proposals took the form of technical assistance in designing a uniform format, stating objectives clearly, planning for evaluation, and providing other consultation as requested.

Within LEAs, the selection of the "lighthouse" or pilot school was made by the central office administrator often in conjunction with school staff. Selection was generally based on the judgement that the school could benefit from the project, would be interested and willing to participate and would put forth a conscientious effort.

The Mastery Learning Model

Mastery Learning, the instructional process being examined in this study, originated from the work of Benjamin Bloom and was developed by James Block, and is summarized in Table 2.

Six of the nineteen participating school systems selected the Mastery Learning model for implementation. Compared to the other models, Mastery Learning has a broad focus which encompasses not only activities in the classroom, but within the school and district as well. The degree of curriculum refinement required in the Mastery Learning process is unique to that model.

The four instructional models of "topics" were analyzed for complexity, and are reviewed by Roberts, et al. (1982):

- Knowledge: how much that is new must be learned?
- Materials: how much do classroom materials need to be redesigned or developed?
- Methods: how much change is required in the way things are done a) in the classroom, b) in the school?
- Organization: how much role change and administrative action are required?

As indicated in Table 3, Mastery Learning is fairly complex, requiring new knowledge in curriculum assessment, analysis and development, and subsequent, re-design or development of appropriate materials. The way things are done changes in

Table 2

Theoretical Basis of Mastery Learning

Study/Model Research/Developer	Characteristics
Mastery Learning Benjamin Bloom James Block	specifying the objectives to be taught breaking objectives down into prerequisite and component skills defining objectives in terms of student behavior providing appropriate instruction aligned with objectives establishing a standard for mastery testing students' progress using formative evaluation measure providing corrective work to students not achieving mastery on the formative test providing enrichment activities to ensure and supplement learning for students who have achieved mastery on formative test testing final mastery of objectives with summative test matched to the objectives recording student progress in terms of individual mastery of specified objectives

the classroom and school since instruction becomes more structured, and record-keeping and curriculum alignment make new demands on faculty. Administrative action is required for planning, analysis and development, and to facilitate test scoring and record keeping. Also, teachers' roles change somewhat since Mastery Learning requires more than usual effort in analysis and development and systematic diagnostic/prescriptive instruction.

(Roberts, et al., 1982)

Table 3

Complexity of the SITIP Topics

Topic / Dimension	AT	ML	STL	TV
knowledge	2	3	3	5
materials	2	4	3	3
methods - in class	2	4	4	3
- in school	1	3	1	3
	1.5	3.5	2.5	3
organization	1	2	1	4
total	6.5	12.5	9.5	15
mean	1.62	3.12	2.37	3.75

Mean ratings vary from a high of 5.00 to a low of 1.00.
AT = Active Teaching, ML = Mastery Learning,
STL = Student Team Learning, TV = Teaching Variables

Research Methods

Since the program represents a statewide initiative implemented through local effort, the study addressed two areas:

- the activities of the MSDE
- the activities of local educators.

Each of these two areas are divided further and evaluation questions addressing local implementation are posed: What implementation activities do LEAs undertake and to what extent does reality reflect written plans?

What roles, responsibilities and relationships emerge and how do they relate to successful implementation? What is the intensity and impact of implementation? What participant concerns are apparent?

Measures and Methods of Data Collection

Four general methods of data collection were used:

- Observation - All formal training and planning events conducted by MSDE were observed and comprehensive notes were taken of the activities by RBS. On-site observations of one pilot site were conducted twice by RBS and other on-site observations of all projects were conducted at least twice by MSDE technical assistants.

- Interviews - Structured, semi-structured, and open-ended interviews were conducted with MSDE technical assistants and school and central office staff at the project sites covering a range of areas and issues.

- Questionnaires - Six questionnaires were used: 1) Stages of Concern Questionnaire, 2) Conference Evaluation Form, 3) Institute Evaluation Form, 4) Follow-up Feedback Form, 5) Technical Assistant Survey, and 6) General Survey.

- Document Analysis - Four kinds of materials were systematically reviewed: 1) articles about the process, 2) materials developed by LEAs, 3) plans developed by LEAs as proposals and descriptive summaries, and 4) logs maintained by MSDE technical assistants.

Data Sources and Analysis

Data sources included program materials, logs, observations of critical events, and responses to interviews and questionnaires by educators of all levels.

Data pertaining to use of time, level of effort, interactive support, roles and relationships, relative classroom value and impact on teachers and students were analyzed by site, by role, and by activity area (i.e., planning, training and implementation).

Findings

The following section describes the statewide implementation of Mastery Learning by the participating school districts and includes discussion of the scope and intensity of implementation, LEA participation in MSDE training and planning events, time spent on the topic, roles and responsibilities of implementation, participants' needs and concerns, and impact.

Scope and Intensity of Implementation

> During the first year of the project, all six districts involved in Mastery Learning carried out their implementation strategies as planned in the fall of 1981...As can be seen in Table 4, the scope and intensity of Mastery Learning implementation varied among the six counties from two teachers to forty (40) teachers, from one grade level to all grade levels, and from one subject to fifteen curricular areas. Across the six LEAs, six schools were involved with 81 teachers using Mastery Learning in approximately 93 classes in grades K-12.
>
> (Roberts, et al, 1982, pp. 185-186)

Mastery Learning was used in only one school in each of the six districts. One of the schools (Baltimore City) was considered the pilot high school for the district while the other districts used a "lighthouse" school approach.

> Mastery Learning was used in mathematics in four counties, for reading/language arts in three counties, for science in three counties, and for social studies in three counties. Two counties used Mastery Learning in other subject areas in addition to the four listed above.
>
> (Roberts, et al., 1982, p. 186)

LEA Participation in Planning and Training

MSDE conducted three training and three planning activities for the districts interested in implementing Mastery Learning. Two of the training programs, the Awareness Conference and Summer Institute, preceded implemen-

Table 4

Scope and Intensity: Mastery Learning Implementation June 1982

Counties	No. of Teachers	No. of Classes	No. of Students	Grade Levels	Subjects	Starting/ Ending	No. of Months
Allegany	29	22	---	K-12	Various	Oct-Feb Dec-June	6
Anne Arundel	4	4	120	9-12	Biology	Jan-June	4.5
Baltimore City	45	57	---	10-12	Various (15)	Sept-May	9
Baltimore Co.	3	3	80	3-4	Math	Sept-June	9
Howard	2	2	---	6	Reading Social Sci.	Feb-Mar	2
Worcester	5	5	100	1-2	Math	Sept-June	9

Table 5

LEA Participant Groups Attending Mastery Learning Conference, Summer Institute and Follow-Up Meeting

School District	Awareness Conference	Summer Institute	Follow-Up Meeting
Allegany	All	1,2, 4	1,2, 4
Anne Arundel	1,2,4, 5	1, 2	1,2, 4
Baltimore City	1,2,4, 5	1,2,4, 5	1,4
Baltimore County	2,3,4, 5	1, 2	1,2, 4
Howard	1,2, 4	1, 2	------
Worcester	1,2,4, 5	1,2,4, 5	1,2, 4

1. Teachers
2. Principals
3. LEA Board Members
4. Central Office Supervisors
5. LEA Assistant Superintendents
6. LEA Superintendents

tation. The Follow-Up Meeting was held during the first year's implementation. The LEA participant groups who attended training activities for Mastery Learning are contained in Table 5. Their ratings of these training events are summarized in Table 6.

The series of training activities provided for the participants of Mastery Learning projects were fairly successful with the mean ratings ranging from a low of 3.73 to a high of 4.51. The weakest factor of the entire program was the presentation by Bloom at the Awareness Conference. The expertise of the trainers in the Summer Institute received the highest rating. Overall, the participants understood the purposes and objectives of the training in advance, felt that the activities were appropriate to the audience and to the objectives, and felt that the training met their needs.

The participants consistently expressed two attitudes throughout the training: 1) a concern for practical information and ideas related to implementation; and 2) a belief that Mastery Learning is worth learning and implementing.

Participation during both training and planning activities was examined for consistency by groups (see Table 7).

> A larger percentage of Mastery Learning respondents had been involved in two or more training events (37.33%) than in planning activities (36%) or in all six activities (9.33%). Sustained attendance for all six activities was best maintained by school administrators (of whom 37.5% were involved) followed by central office staff and teachers (with 12% and 5.08% respectivly)...
>
> Ideally, for each county, each role group should have been requested in all six activities, and individual representation should have been sustained to maintain a sense of

Table 6

Participants' Ratings of Training Events** for Mastery Learning
(Means for Four Criteria)

Topic / Event* / Item	Mastery Learning AC N=140	SI N=26	FU N=33	
Prior to attending, I understood the objectives of the meeting.	4.08	4.25	4.38	4.15
Objectives were clearly presented at the meeting.	3.85	4.78	4.63	4.10
Activities were appropriate for objectives.	3.82	4.58	4.59	4.05
My needs/concerns were satisfactorily addressed.	3.54	4.24	4.14	3.73

** Mean ratings can vary from a high of 5.00 to a low of 1.00.
* Events: AC = awareness conference FU = follow-up sessions
SI = summer institute

Table 7

Attendance Patterns for Training and Planning Events:
Mastery Learning (June 1982)

	Total Respondents N	%	Training 2 or more Events %	Planning 2 or more Events %	All 6 Events %
Total	75	100	37.33	36	9.33
Central Office	8	100	25	50	12.5
School Administrators	8	100	75	75	37.5
Teachers	59	100	33.90	28.81	5.08

> continuity and build a cross-hierarchical knowledge base and consensus about the topic and how it was to be implemented. At the minimum, each county should have involved representatives from all three role groups in at least two training and two planning activities.
>
> Overall, all LEAs except Baltimore County involved cross-hierarchical teams in at least two training and two planning activities. Only Allegany County and Baltimore County had at least one member from each role group participating in all six activities. School administrators were more heavily involved in planning than central office staff and teachers. Central office staff were more heavily involved in planning that were teachers, whereas the opposite was true for training.
>
> (Roberts, et al., 1982, pp. 186-189)

Time Spent on the Topic

This section discusses the time spent on Mastery Learning during the first year of implementation. Time across the school year is discussed first, followed by a discussion of use of time in the classroom.

The majority of respondents began implementation in October of 1981. All districts had started teaching Mastery Learning units in the classroom by February of 1982. Some teachers from each county except Howard were using Mastery Learning in May and June of 1982. The majority of respondents ended implementation in June.

In Anne Arundel County, four biology teachers started Mastery Learning in January and used the strategy for their classes through the remainder of the school year.

Implementation was limited to a "trial" period between February and March according to the design of the Howard County project. One language arts teacher and one social studies teacher used Mastery Learning to teach a single unit to the same class of students during this period.

Both Anne Arundel and Howard Counties used a team teaching approach for implementation.

Three teachers of third and fourth grades in Baltimore County used Mastery Learning in mathematics between September and June. A similar project was conducted in Worcester County with five teachers in first and second grades using Mastery Learning in mathematics for the entire year.

Allegany's lighthouse school was a combined elementary and secondary (K-12) with all teachers using Mastery Learning to teach one unit during the first semester and two units during the second semester. First semester implementation occurred between October and February with the other units being taught between December and June.

A secondary school project took place in Baltimore City involving three teachers in each of the fifteen subject areas of this comprehensive high school (grades 10-12). Between September and May, each discipline was to use Mastery Learning to teach at least three units; in general, teachers surpassed this expectation by completing two units each.

Anne Arundel, Baltimore County, Howard, and Worcester accomplished their planned period for implementation (see Table 4). Allegany and Baltimore City did not indicate on the proposal form a planned time period for classroom implementation.

> Asked whether Mastery Learning required teachers to spend more time preparing students (e.g., grouping, pre-testing) respondents agreed. In general, the respondents felt that Mastery Learning did not allow the teacher to cover curriculum in less time. However, school administrators and teachers were less sure about how to respond to the statement on curriculum coverage than were central office staff. Many teachers felt that although less curriculum may have been covered, the curriculum was taught more thoroughly and was retained by more of the students.
>
> (Roberts, et al., 1982, pp. 190-191)

Roles and Responsibilities

The implementation of Mastery Learning involved the staff of the Maryland State Department of Education assisting cross-hierarchical teams within each districts. This section describes the people involved, what they did, and their relationship to each other.

State Staff - One of the SEA's objectives for SITIP was to develop greater coordination among its divisions responsible for instruction. To achieve this, one representative was selected from each division to serve as a technical assistant (TA) for the SITIP project. A team of two TAs was assigned to each topic with about 10% of their time officially allocated to the project. For Mastery Learning, one was the Branch Chief in the Office of Staff Development and the other was a specialist in Compensatory Education.

The primary objective of the TA's role is to provide assistance to facilitate implementation at project sites. They function as linkers -- linking the LEAs to the knowledge base and topics and networking among sites; as facilitators -- helping them achieve their goals, meeting the needs which they have identified, and helping them to solve their problems; as coordinators -- sharing materials and organizing training activities.

Tasks performed by the TAs are in ten areas: 1) general administration and budget, 2) planning, 3) knowledge building, 4) materials identification and development, 5) training, 6) general support, 7) site visits, 8) evaluation, 9) communication, and 10) dissemination. These tasks required about two days per month for each TA.

Local Staff - Each local superintendent committed cross-hierarchical teams for a two-year implementation period in addition to the training and

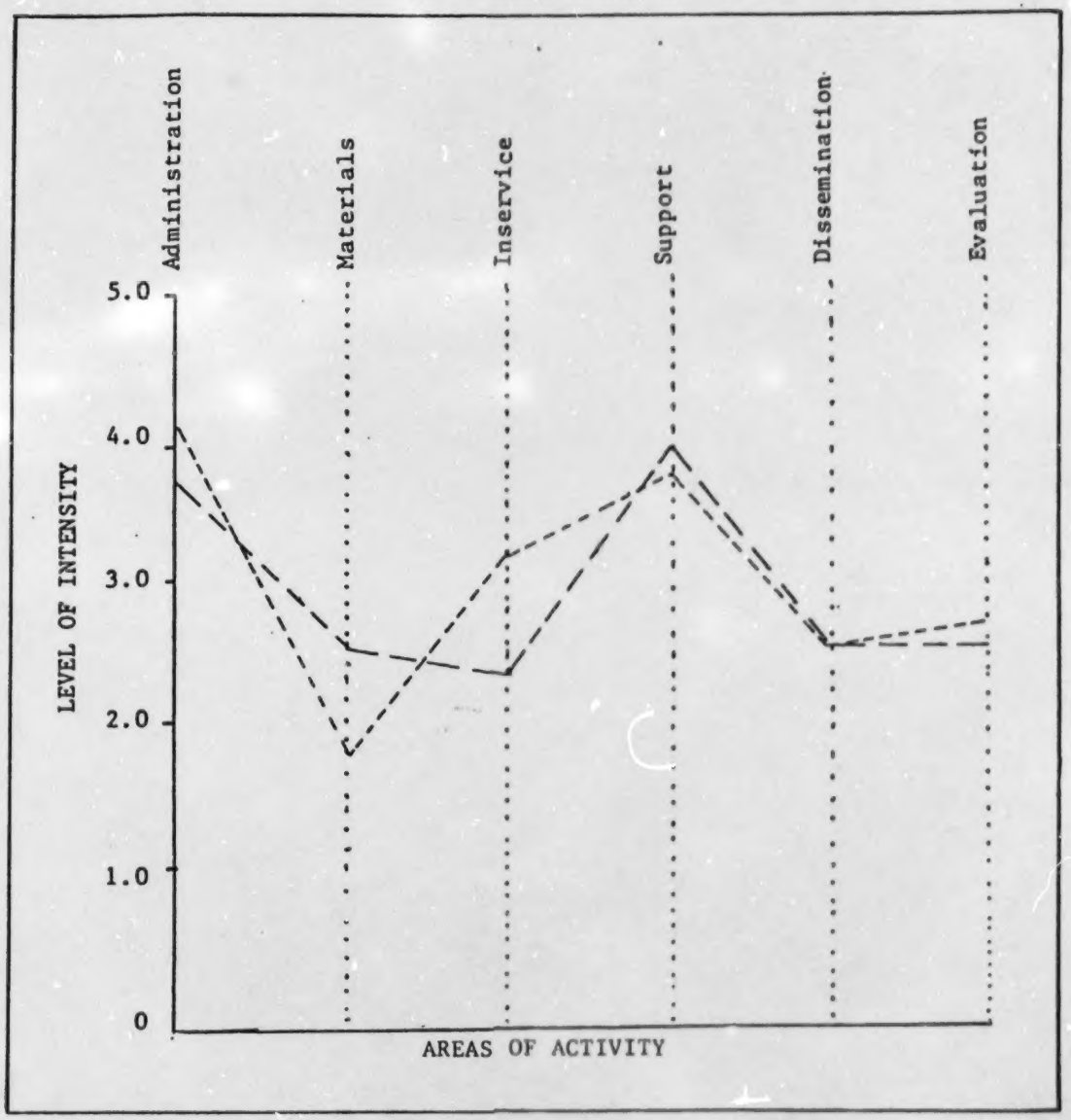
planning activities of 1980-81. These teams consisted of the following: 1) central office staff; 2) school administrators; and 3) classroom teachers. Of the ten central office staff actively involved in Mastery Learning, four were instructional supervisors, three were coordinators of special projects, one was primarily responsible for staff development, one was in research and evaluation, and one was responsible for curriculum. In addition to the building principal, three districts designated another member of the staff to assist in coordinating the project at the school site. These are referred to as teacher-coordinators and include a department head, a curriculum planner, and a teacher who was released from classroom responsibilities to serve on the project. The following sections describe the activities undertaken by local staff and interactive support, with reference to the level of effort and use of time for implementation of Mastery Learning.

Activities and Levels of Effort - In general, traditional responsibilities were assumed by each role group. For central office staff and school administrators, six activity area were identified: 1) administration (including planning and budget); 2) development of materials; 3) designing and/or conducting inservice; 4) supporting school implementation; 5) dissemination; and 6) evaluation. For each area they were asked to indicate level of effort (time and energy) spent (with responses ranging from a low of 0 to a high of 6).

> As shown in Table 8, central office and school administrators spent similar levels of effort on all areas of activity except materials development (in which school administrators were more involved) and inservice (in which central office staff were more involved). Most effort was spent on support and least on materials development.

Table 8

Level of Effort: Mastery Learning



Specific LEA responses indicate that, for administration, if the central office staff put in more effort, the school administrators did less instead of spending time on support to teachers.

All three groups were asked to rate the amount of time required for Mastery Learning in comparison to other projects in which they had been involved. On a scale of 1.00 (substantially less) to 5.00 (substantially more), the Mastery Learning implementers indicated that the instructional process required more time compared with other strategies (see Table 9). Teachers found that all activities required more time (mean of 4.30) with preparing and organizing materials (4.45) and record keeping (4.2) rated highest. Central office staff found Mastery Learning to require more time in becoming informed (4.25) and in interacting with school personnel (4.13) but about the same amount of time as other strategies in preparing and organizing materials (2.71), record keeping (3.12) and evaluation (3.31). School administrators rated all the activities as requiring more time (mean of 4.28) with interaction with school personnel rated highest (4.63).

(Roberts, et al., 1982, pp. 192-194)

Table 9

Perceptions of Support Received: Mastery Learning

Topics & Respondents	N	Teachers	School Administrators	Central Office Staff	MSDE	Developers
Central Office	7	4.43	4.14	4.00	3.71	4.14
School Administrators	8	4.25	4.67	4.75	4.50	4.50
Teachers	53	3.39	3.59	3.11	3.13	3.14
Total	68	3.59	3.75	3.39	3.35	3.40

Mean ratings range from a low of 1.00 (very poor) to a high of 5.00 (excellent).

Interactive Support - In most cases, support was provided by school-based staff (teacher/coordinators or school administrators) with some support from central office staff. However, the latter group were primarily responsible for project administration and support for organizational problem-solving such as arranging for common planning time, test scoring, etc. Teachers and coordinators did most of the work relating to materials development -- aligning the curriculum to objectives and developing formative and summative tests. That being the case, it was important for teachers to be supported by school and central office

> administrators both in terms of time to work together and in terms of acknowledgement and encouragement of their efforts. Where such support were perceived as inadequate by teachers, changes had to be made by administrators if implementation was to be successful. (This occurred in one district in March, initiated by teachers' requests and facilitated by the Maryland State Department of Education TAs.)...
>
> Implementers were asked to rate the support received from each role group and from Maryland State Department of Education and topic developers (from 1.00 - very poor to 5.00 - excellent). As indicated in Table 10, central office staff and school administrators were generally more positive in their assessments, rating all groups between 4.00 and 5.00. Teachers were, in general, less positive, rating the groups between 3.00 and 4.00. Central office staff gave the highest ratings of support to teachers; school administrators gave their highest ratings to central office staff; and teachers indicated that school administrators had provided the most support.
>
> (Roberts, et al., 1982, pp. 195-196)

Participant Needs and Concerns

The needs and concerns of participants were identified by the Stages of Concern Questionnaires (SoCQ) and through surveys, interviews, and observations.

The SoCQ were administered at the conclusion of the 1981 Summer Institute and again in June 1982. A comparison of the results presented in Tables 11 and 12 identifies differences among role groups, all three of which changed from 1981-1982.

> The most significant change for teachers related to consequences and collaboration: attention to management and their own workloads and roles was of far greater importance to them than thinking about impact on students and activities of colleagues. In contrast, school administrators became much more interested in what others were doing with Mastery Learning, and central office staff concerns became generally lower. The relatively high awareness concerns for all three role groups suggest that Mastery Learning was one of many things participants were involved with and may well be not the most important.

Table 10

Use of Time: Mastery Learning

Activity \ Role	Central Office N=8	School Administrators N=8	Teachers N=56	Total N=72
Becoming informed	4.25	4.38	4.27	4.27
Interacting with school personnel	4.13	4.63	4.21	4.25
Preparing/organizing materials	2.71	4.00	4.45	4.23
Record Keeping	3.12	4.25	4.42	4.25
Evaluation	3.13	4.13	4.14	4.03

Mean ratings range from a low of 1.00 (substantially less time) to a high of 5.00 (substantially more time).

Table 11

SoCQ Responses, Mastery Learning (July 1981)

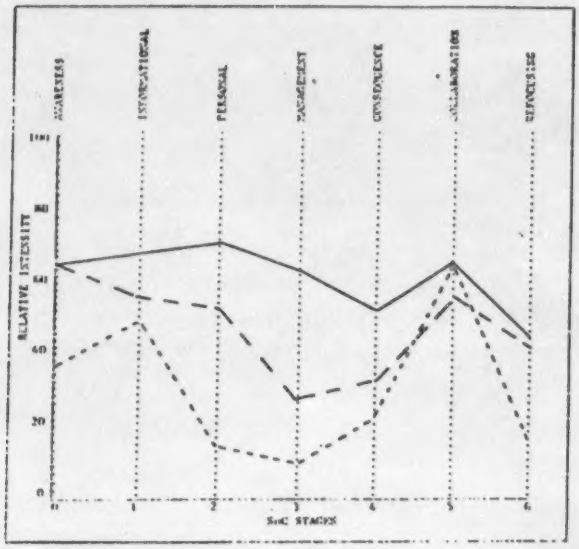
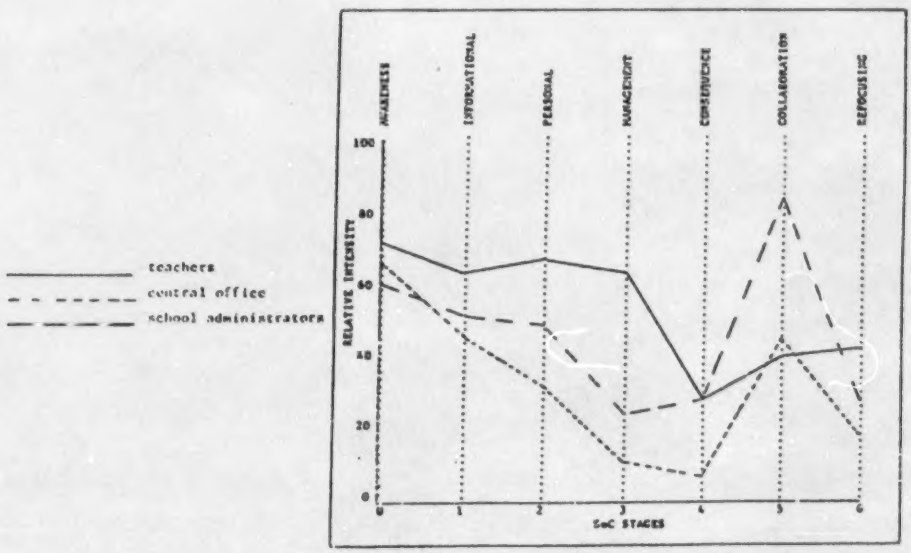


Table 12

SoCQ Responses, Mastery Learning (June 1982)



Results suggest that most of the Mastery Learning workload fell on teachers, who would probably benefit from support from the other two groups -- in the form of information, management assistance (e.g., materials development, or test design and scoring), and acknowledgement of the efforts they have made.

(Responding to the general survey) some participants made no recommendations, others made several, with a total of 48 statements, 10.42% of which recommended "no change" and 16.75% recommended expansion to other schools or more units of instruction. A research and evaluation design was requested by 10.42% (three LEAs)...The greatest number of recommendations related to training (22.92%) and support (31.25%)...In three LEAs, support needs (12.5%) were defined in terms of central office -- that Mastery Learning should be coordinated with county curriculum objectives and that central office commitment should be more evident. Teachers expressed needs for assistance, time to plan, materials, and clear, simpler guidelines or procedures (16.67%).

(Roberts, et al., 1982, pp. 203-205)

Impact

This section discusses the impact of Mastery Learning on instruction in general and, more specifically, on teachers and students. Table 13 summarizes the responses given by Mastery Learning implementers to several statements concerning impact.

Instructional Value - In general, the Mastery Learning implementers agreed that the instructional process was worthwhile. However, they were less sure about whether the process was worth the amount of time and effort that was necessary for implementation. Teachers were especially unsure in their response to the statement that Mastery Learning is more work than it is worth. Looking across the individual counties, mean responses to this statement ranged from 2.00 to 3.80 (1.00 strongly disagree, 3.00 not sure, 5.00 strongly agree). Since Mastery Learning is a complex innovation requiring time for planning, materials development, and record keeping, it could easily be perceived by teachers as requiring too much work for the benefits received. However, implementers, when interviewed during site visits, felt that even though Mastery Learning required a great deal of preparation time, students were doing better and were, in general, more enthusiastic about what they were learning, thus making the extra preparation worthwhile.

Table 13

Impact of Mastery Learning as Perceived by Active Implementers (June 1982)

Areas of Impact / Role / N =	Central Office	School Administrators	Teachers	Total
Instructional Value				
Is it worthwhile/workable.	4.37	4.81	3.89	4.05
Is it more work than it's worth.	2.75	2.38	3.00	2.90
Impact on teachers				
Ts enjoy it.	4.00	4.13	3.48	3.61
Ts gain knowledge.	4.63	4.63	3.63	3.85
Ts increase skills.	4.25	4.50	3.49	3.69
Impact on students				
Ss enjoy it.	4.00	4.38	3.74	3.84
Ss are more involved in work.	3.75	4.13	3.53	3.62
Ss increase achievement.	3.56	3.93	3.37	3.46
Time				
Ts spend more time preparing Ss.	4.37	4.00	3.87	3.94
Ts cover curriculum in less time.	2.50	2.87	2.86	2.33

NOTE: Mean ratings range from 1.00 (strongly Disagree) to 5.00 (Strongly Agree).

The majority of LEA implementers indicated that the instructional value of Mastery Learning lies in the organization and effectiveness of the instructional process. Mastery Learning helps teachers to develop well organized and effective lesson plans. Implementers described Mastery Learning as focused and practical. Several of the local educators indicated that they liked the philosophy behind Mastery Learning, that all children can master a given concept if given the chance. Implementers, especially teachers, disliked the amount of planning and record keeping required by Mastery Learning and mentioned how the structure of the method can be a problem when student attendance patterns are irregular.

Impact on Teachers - The mean responses in Table 11 to the statements pertaining to the impact of Mastery Learning on teachers were positive, indicating that teachers enjoyed Mastery Learning (3.61), and had acquired additional knowledge and skills as a result of Mastery Learning implementation (3.85 and 3.69 respectively). Teachers were less positive in their responses to these statements of Mastery Learning impact on teachers than were central office staff and school administrators. Educators from Howard County were more positive about Mastery Learning impact on teachers than were the educators from the other counties.

LEA implementers felt that Mastery Learning enhanced the professional development of teachers, helped teachers to become better organized, and increased cooperation between teachers and school administrators and central office staff. However, teachers disliked the amount of time Mastery Learning required, especially in the areas of planning, record keeping, and materials development. Teachers in two counties felt a lack of support from school administrators and central office staff. Teachers commented on the need for support from school administrators for planning time and for the opportunity to interact with other teachers using Mastery Learning.

Impact on Students - LEA implementers indicated that students enjoyed Mastery Learning and were more involved in their work. Respondents were less sure about whether Mastery Learning increased student achievement, and teachers were less certain in their responses about Mastery Learning impact on students than were central office staff and school administrators. Worcester County educators were positive in their responses to the impact of Mastery Learning on students than were educators from the other counties. Teachers commented upon how students were more involved in the lessons and were more positive in their attitudes toward

> school. Students liked the second change that they received on summative tests. However, implementers felt that Mastery Learning held back the higher ability students and was, therefore, more effective when teaching a homogeneous group of students.
>
> The majority of respondents indicated that student achievement had increased as a result of Mastery Learning. Baltimore County estimated student gains as twice those expected. However, several educators were not sure about the amount of student achievement gains, since no formal assessment had been done. Most teachers had used their own tests to measure the impact of Mastery Learning on student achievement. Teachers from two out of three of the pilot site counties reported that their students were achieving the mastery goals that had been set by the individual counties.
>
> (Roberts, et al., 1982, pp. 199-202)

During the first year of implementation, two districts (Baltimore County and Worcester County), which used Mastery Learning in mathematics at two elementary schools, evaluated its impact on achievement using standardized tests administered pre/post.

One district reported gains of 13 months for first graders on the California Achievement Test from an average of 1.2 grade equivalent to 2.5 between November and June. Second graders gained 10 months, from 2.3 to 3.3. These rates of growth are above the national norms for the test and well above the growth of other students at the school.

The other district compared Metropolitan Achievement scores to those predicted for other students with equivalent pretest scores. Fourth graders gained an average of one year and three months more than the predicted growth. At the third grade level, the Mastery Learning difference was seven months greater that expected.

> Summary - In general, Mastery Learning has had an impact on both teachers and students. Teachers are better organized and students are more involved in learning. However, Mastery Learning requires a great deal of preparation on the

> part of teachers and support from school administrators in order to make it work. Teachers believe that Mastery Learning is not equally applicable in all subject areas, and can hold back higher ability students.
>
> (Roberts, et al., 1982, p. 202)

Second Year Implementation

The 1982-83 school term marks the second year of implementation for the project schools. During the preceding summer, several districts planned and conducted activities designed to expand the scope of the project. Expansion took various forms: increasing the implementation period to cover the full year; training additional teachers to use the process; and initiating Mastery Learning in six additional schools within two districts.

In addition, a district which had declined participation during the first year opted to implement Mastery Learning during the 1982-83 school term. With the help of the Maryland State Department of Education TA, Carroll County submitted a proposal to implement Mastery Learning in one middle school by two social studies teachers. The central office supervisor of social studies and the school's principal compliment the team. Orientation was provided by the TA and through visits to other, experienced Mastery Learning schools.

The TAs planned and conducted a two-day retreat to provide follow-up training for Mastery Learning teams of all six LEAs. A needs assessment survey was taken to identify specific elements of Mastery Learning perceived as areas of need of interest by the participants. The training program was designed to refine skills for effective implementation of Mastery Learning and addressed critical topics such as: the planning and

management of correctives and enrichments; analyzing and assessing prerequisites and component skills; test construction; and evaluation. Presentations were conducted by an external consultant, the Maryland State Department of Education TAs and staff from local projects selected for particular topics according to the strengths of their programs.

On-going technical assistance is provided to the original project schools and has been extended to the new school adopting Mastery Learning.

II. AN EXAMPLE OF DISTRICT LEVEL IMPLEMENTATION

Implementation of Mastery Learning at Forest Park High School, Baltimore, Maryland is cited here as an example of local involvement at various staff levels through a model developed at the pilot school after SEA orientation. Discussion is limited to 1) background; 2) participant roles and responsibilities; 3) project scope; 4) participants' concerns; 5) impact; and 6) discussion.

Background

The stated purpose of the Mastery Learning Project at Forest Park High School is to develop a model for a school-based staff development program in Mastery Learning in order to improve classroom instruction and student learning at the high school level.

The primary project objective states that by the end of the project forty-five participants, given instruction in the principles and techniques of Mastery Learning, will develop and teach Mastery Learning units according to stated criteria.

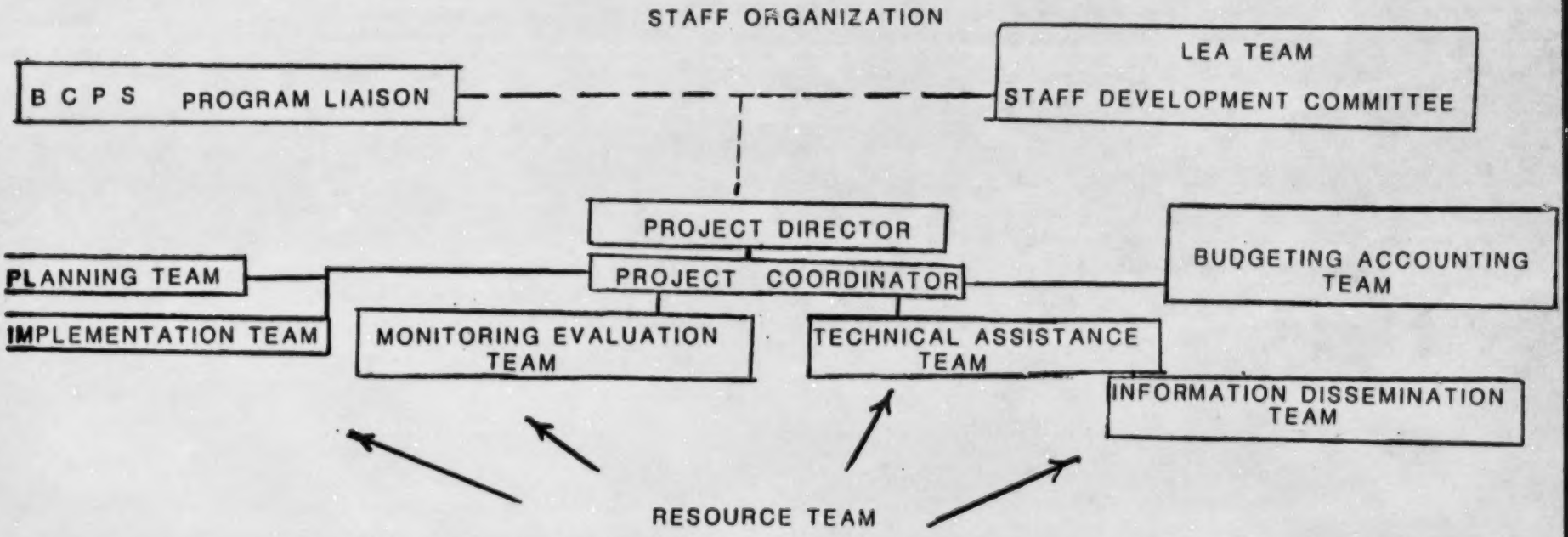
The staff development model which undergirds the project was designed initially to facilitate a "volunteer staff" for a pilot project. Volunteers were drawn from faculty, central office staff, parents, and students. As the project phases out, a "satellite" is expected to remain operational to continue the implementation of Mastery Learning and other supportive instructional initiatives.

Both designs are significant because the models: 1) facilitate the process-and-product needs inherent in staff development and personalized professional development; 2) facilitate the accomplishment of tasks with

Table 14

The Mastery Learning Project: Task Teams at Forest Park High School *

Baltimore City Public Schools, Baltimore, Maryland



* TASK TEAMS ARE THE HEART OF THE STAFF ORGANIZATION FOR THE MASTERY LEARNING PROJECT AT FOREST PARK HIGH SCHOOL. VOLUNTEERS CARRY OUT THE RESPONSIBILITIES FOR PLANNING, IMPLEMENTATION, MONITORING-EVALUATION, TECHNICAL ASSISTANCE, INFORMATION DISSEMINATION, BUDGETING ACCOUNTING, AND RESOURCE HELP. THE PRINCIPAL SERVES AS PROJECT DIRECTOR AND A TEACHER SERVES FULL TIME AS COORDINATOR.

minimal funding and maximized use of existing resources; and 3) support further the research undergirding the Maryland effort to improve instruction.

Participant Roles and Responsibilities

Task Teams are the heart of the staff organization for the Mastery Learning Project at Forest Park High School. Forty-six volunteers carry out the responsibilities for planning, implementation, monitoring-evaluation, technical assistance, information-dissemination, budget-accounting, and resource help. Specific duties are noted in Table 15. The volunteers are faculty members, students, parents, and central office personnel.

Three persons form an Administrative Task Team. They are the project director, the project coordinator, and a representative from the Program Liaison Office of the Baltimore City Public Schools. In the Forest Park model, the school principal serves as project director and a teacher serves full-time as project coordinator. In the project model, the school staff development committee serves as an advisory group. Several of the members also are functioning as part of the liaison team of the local education agency to coordinate activities with the Maryland State Department of Education, the funding agency and sponsor of the program School Improvement Through Instructional Process. Prior to the project launching a staff development committee of ten persons handled preliminary tasks now delegated to teams.

The designated classroom teacher participants who develop Mastery Learning unit plans according to stated criteria exercise an option to work individually or departmentally with others in a designated subject area.

Table 15

Roles and Responsibilities of the Forest Park Team

Task Team	Major Responsibilities
Administrative Team	
Project Director	To serve as liaison with the Maryland State Department of Education, the Baltimore City Public Schools, and the Forest Park High School/Community in carrying out the project according to proposal specifications; to facilitate appointments and operations; to serve as active member of all project task teams
Project Coordinator	To coordinate and facilitate the planning, implementation, ane evaluation of the day-to-day operations necessary to complete the project according to specifications; to serve as an active member of all project task teams; to serve as chairperson of the Planning, Implementation, and Monitoring-Evaluation Teams
BCPS Special Project Liaison	To coordinate and facilitate all tasks necessary to carry out the project according to funded-project guidelines of the Baltimore City Public Schools;

Table 15 cont.

Task Team	Major Responsibilities
BCPS Special Project Liaison	to serve as ex-officio member of all project task teams
Planning Team	To outline the tasks and deadlines necessary to complete the project according to specifications of the funding proposal
Implementation Team	To address the needs that arise in introducing and carrying out the Mastery Learning process and project at Forest Park High School
Monitoring-Evaluation Team	To develop the criteria for determining if the tasks are completed properly; to determine if tasks are being completed satisfactorily; to suggest remedies for eliminating dysfunction; to assess the effectiveness of the project in terms of stated criteria, goals, objectives, and expected outcomes
Information-Dissemination	To communicate information about the Mastery Learning Project at Forest Park High School

Table 15 cont.

Task Team	Major Responsibilities
Technical Assistance Team	To reproduce printed, graphic, and audio-visual materials generated during the project
Budgeting/Accounting Team	To handle all fiscal matters relating to the project
Resource Team	To serve as consultants in specialized areas of instruction, evaluation or technical assistance upon request.

Orientation and coaching assistance are available on-site through the project coordinator and others trained at SEA-sponsored Mastery Learning workshops. Some participants fulfilled their responsibilities additionally through participation in a state-approved Mastery Learning workshop for in-service credit developed through local initiative and conducted at Forest Park High School during the first year of the project.

Scope

The project objective specified an involvement level of forty-five participants. By the end of the first reporting period forty participants had involved fifty-seven classes in Mastery Learning in fifteen subject areas. By the end of the first year of the project, fifty-two staff members were eligible for in-service credit for completing the requirements of the on-site Mastery Learning workshop.

During the second year of the project, staff changes have resulted in five additional participants. Curriculum specialists and coordinators from the central office level have been involved in direct, on-site tasks to facilitate Mastery Learning implementation.

Throughout the project, a significant level of involvement has been evident. In attendance at critical events, the school-based segment of the Baltimore group has remained constant with the representatives showing one hundred percent attendance at SEA training and planning sessions.

First-year data on time-effort devoted to Mastery Learning suggests substantially more time is being devoted to improving instruction through this strategy. In each category of Table 16, Baltimore staffers reflected

Table 16

Use of Time: Statewide/Local Variation

Role / Activity	Statewide Totals N=72	A Local Variation N=33
Becoming informed	4.27	4.34
Interacting with school personnel	4.25	4.23
Preparing/organizing materials	4.23	4.13
Record Keeping	4.25	4.03
Evaluation	4.03	4.10

a mean range of 4.00 or higher with becoming informed showing the highest mean rating.

Becoming informed seems an expected time priority in the staff development approach to Mastery Learning implementation used in the Forest Park model. In addition, prior training and planning during an exploratory year may have eased the time demands upon teachers for preparing and organizing materials and for devising a record-keeping system. The format and guidelines for unit planning and record-keeping were developed as resource materials during the exploratory year.

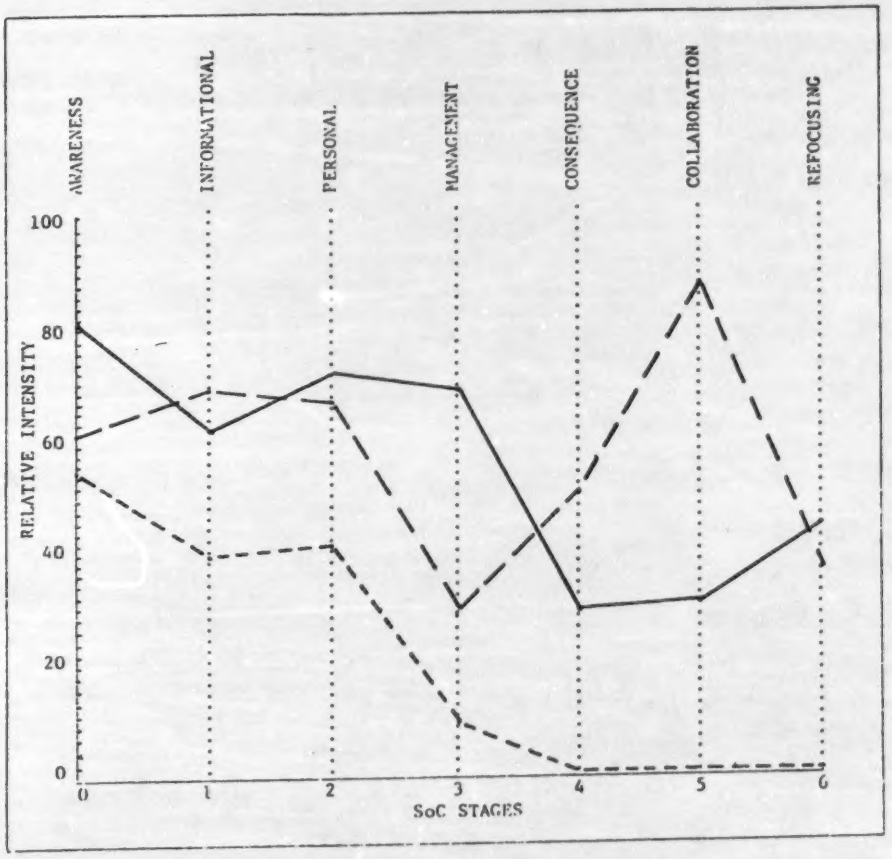
Participant Concerns

Concerns were identified through the Stages of Concern Questionnaire (developed by the R&D Center at the University of Texas) and are illustrated in Table 17. In June 1982, teachers had high personal concerns reflecting their opinion that Mastery Learning was one of several priorities in which they invested time, and still presented some management difficulties. School administrators were most interested in learning what others were doing to implement Mastery Learning and the kinds of results being achieved. Both school administrators and central office staff considered this projet one of several priority tasks.

The variations in stages of concern among staff levels appear related to role, approach to implementation, and project stage. Teacher concerns regarding role expectations in relationship to the project, time and classroom management with existing work loads, potential risks and rewards, reflect human and attitudinal factors which greatly impact upon project progress and merit further study. Moreover, using a staff development

Table 17

SoCQ Responses, Mastery Learning,
Baltimore City (June 1982)



_____ teachers

_ _ _ _ _ _ school administrators

---------- central office staff

approach to implementation requires a high degree of school-based initiative with accompanying consequences.

In general, school staff were concerned about the time needed for lesson planning and record-keeping, and felt a need for support to simplify and clarify procedures and to engage in active problem-solving. These needs were addressed in the second year of implementation, in part by increased support from administrators.

Impact

While statistical data on impact are limited, other preliminary documentation is suggestive of positive impact.

1. Project data show an increase in on-site collaborative sessions between curriculum coordinators and pilot school staff.

2. Samplings of preliminary data on criterion-referenced test for Mastery Learning units show class percentages of students in passing-mastery ranges from 65% to 100%. (See Table 18).

3. Four other teachers trained by the first Mastery Learning team to receive SEA training are conducting workshops for other schools as part of the project dissemination effort.

4. Project participants have made available for general sharing selected resource units and other project materials.

5. As a result of findings from the initial effort, the Forest Park team is proposing a follow-up project with an emphasis on a computerized instructional management system.

Table 18

Impact Data on Student Achievement

Class	% Achieving Mastery Formative	% Mastery/ Passing Summative	Class	% Achieving Mastery Formative	% Mastery/ Passing Summative
1	50	88	11	67	87
2	46	75	12	65	80
3	67	84	13	62	95
4	30	67	14	44	91
5	41	74	15	42	92
6	45	84	16	42	71
7	53	78	17	40	80
8	63	80	18	77	100
9	43	73	19	77	88
10	20	90	20	82	82
Totals				1,057	1,659
Mean				52.85	82.95

According to theoretical research guidelines on Mastery Learning impact effectiveness, 30% to 50% of the students in a given group may be expected to achieve the stated mastery level the first time Mastery Learning is implemented without the benefit of sequencing or repetition. In the above random sampling from the Forest Park Project 95% of the classes reached or exceeded the first-implementation norms. Improvement impact for

underachievers also was significant with 67% to 100% of the students in a given group reaching mastery or passing grade levels.

Discussion

One objective of this paper is to present a model which focuses the structure for school-based activity in the implementation of Mastery Learning. The staff structuring described herein shows the interaction design for the involvement of the urban pilot school and the local education agency in Maryland's statewide effort to improve instruction.

The model is significant because 1) it is the result of school-based initiative, and 2) it encourages on-site coaching and problem-solving by forming a resource task team of central office and SEA personnel to work with staff of the pilot school in applying the Mastery Learning strategy to various high school disciplines. It is expected that the description of the model will aid 1) other school-based staff in implementing Mastery Learning, 2) policy makers and administrators in LEAs working on system-wide school improvement, and 3) state officials providing support.

The process elements of the Forest Park model raise pertinent questions for educational research. Staff development efforts stimulate inquiry regarding factors in the affective domain of Bloom's Taxonomy which undergirds Mastery Learning. How does the school staff reflect what is happening in the affective domain as teachers move from the awareness level to the valuing level and beyond when training for Mastery Learning implementation? What parallels are reflected in the Stages of Concern data generated during the SITIP effort?

III. CONCLUSIONS

Important conclusions may be derived from the data that relate to the effectiveness of Mastery Learning as an instructional improvement process and the success of the design used for implementation.

First, Mastery Learning is effective and appropriate as an instructional improvement process. It has been developed thoroughly and is well documented in the literature. This specificity combined with the availability of resources -- experts, experienced practitioners, printed information, etc. -- facilitate the training of teachers. Teachers quickly grasp the instructional strategy inherent in Mastery Learning (formative tests followed by correctives and enrichments) and feel comfortable with it. Accepting the Mastery Learning process comes more slowly possibly as a result of the teacher's past experiences and the juxtaposition of the ideal and the realities of high absenteeism and low student motivation.

The greatest value of Mastery Learning was that it increased teachers' knowledge and skills in lesson development and instructional organization. Mastery Learning requires considerably more planning prior to instruction. Identifying and prioritizing specific objectives, writing them behaviorally, constructing parallel forms of tests, and designing different activities for enrichments and correctives required a broader knowledge and new skill. Students appreciated the "no fault" test and indicated that this helped them to limit and direct their study to those learnings which they had not mastered.

Mastery Learning was found to be appropriate to all grade levels (K-12) and in a wide variety of subjects. In all settings, however, the

traditional approach had been total class instruction with limited sub-grouping. Thus, Mastery Learning resulted in increased individualization but created concern for some teachers about planning and managing separate groups for correctives and enrichments. There was also concern that less content would be covered, that Mastery Learning might hold back high ability students and Mastery Learning was difficult to implement when student attendance was irregular. These potential problems became the foci of follow-up training and refinement during the second year of implementation.

While Mastery Learning was used in a variety of subjects, teachers found that some content areas within a subject were more appropriate than others. In language, for example, Mastery Learning was used in teaching grammar but not for literature. In art it was used for the history and theory of the subject.

Closely related to the assets of Mastery Learning as an instructional improvement process are notable liabilities, the most significant being that Mastery Learning takes considerable time and effort to implement. Support to teachers, inservice and interaction with others, materials development and record-keeping all took more time with teachers most involved with the last two as part of the planning process. Teachers were doubtful that Mastery Learning was worth all the work and disliked spending so much time on planning and record-keeping. To be successful, teachers must feel that they are provided the opportunity and environment to succeed -- information, materials, time, and support. Although most central office staff and school administrators considered the support received from each

other and from teachers as being above average, teachers were less satisfied with the support they had received, especially from central office.

The particular subject area and the districts' existing curriculum serve to either facilitate or impede its adaptation to the Mastery Learning process. If, in the curriculum, skills are clearly identified, sequenced and accompanied by suggested activities and test items, the task becomes much easier and enables teachers to concentrate on teaching according to the intended strategy. Teachers who had written their tests in advance and had planned for correctives and enrichments had little difficulty teaching the Mastery Learning units. Those who lacked sufficient time for advanced planning had difficulty handling both tasks simultaneously.

The required time and effort present serious problems for broad-based implementation. Many districts would find it difficult to provide adequate support and release time for planning and many teachers may lack the commitment to meet these demands. Teachers need help in ensuring quality and in finding ways to reduce the workload. It would probably be useful for all LEAs to review their implementation strategies, their arrangement of roles and responsibilities to leadership and support, and the extent to which school-based Mastery Learning can or should be linked to district efforts. Centralized curriculum development and refinements at the district level should be considered prior to teaching training for implementation.

Next, the design used for implementation of Mastery Learning in this study demonstrates that an SEA can affect instructional improvement with limited financial input and without legislating or mandating. Significant features of the design include: 1) a training approach involving cross-

hierarchical teams; 2) SEA leadership and technical assistance; 3) LEA decision-making; 4) voluntary participation; and 5) team effort.

The investment which is required by the SEA is staff for support and technical assistance. The complexity of the topic should be taken into consideration in allocating time and resources for support. Mastery Learning probably required more time and resources from the SEA than was provided to some districts. Support and assistance to teachers was significantly greater in those projects which incorporated the role of teacher-coordinator with a reduced teaching load and clear leadership and authority. This role had a strong positive influence in implementation and indicates that complimentary technical assistance by state and local staff strengthens the design. Technical assistance from the SEA could address the overall project (central office and school levels) focusing on process while the local coordinator assists teachers with specific needs.

The potential of Mastery Learning as a vehicle for instructional improvement in the future appears great despite the negative cost/benefit investment by teachers at the present time. This optimistic outlook is based on recent developments which should reduce the burden on teachers. Several publishers are producing texts suitable to the Mastery Learning approach. Some include formative and summative tests and activities for correctives and enrichments. The management of skills for individual students and related record-keeping are tasks which now can be shifted from teachers to microcomputers. This area should definitely be explored by any district considering implementing Mastery Learning.

The question now is not whether Mastery Learning works, but where and under what conditions does Mastery Learning work best. Additional research focusing on the impact of Mastery Learning in different schools, grades, subjects, skills, and for different students is needed. Longitudinal studies following students through several years of Mastery Learning instruction to determine any cumulative effect and others following students beyond Mastery Learning instruction to determine its sustained effect would provide valuable information for educational decision makers.

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